Purdue Kokomo Capstone Team 19.5: Endress+Hauser Demo Unit

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Customer Background

- Swiss-based Company founded in 1953
- Global Leader in measurement instruments, services and industrial solutions
- Process solutions for flow, level, pressure, temperature, and analytic services
- Over 15,800 Employees worldwide
- Just under 3.3 Billion Euros in net sales

Problem Statement / Scope of Work

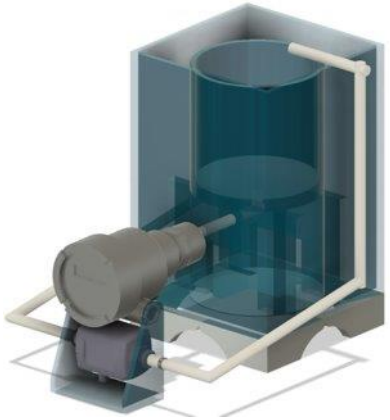
The customer, Endress+Hauser, needed a simple, portable, and interactive demonstration unit to display their instruments.

- Design conceptual prototypes of sensor layout/sizing
- Develop 3D models of components and overall assembly
- Configure Wiring schematics/Fluid Schematics

Requirements

- Must demonstrate all sensors provided by Endress Hauser
- Easily transportable/usable by one person
- Be free of leaks
- Easy to clean/drain
- Fun/interactive for children
- Fit in Pelican Case

Experimentation and Concepts



Final Design

FMEA

Revision #	Continuous Improvement: History / Change Authorization (As Applicable)	STRUCTURE ANALYSIS (STEP 2): 1. Next Higher Level	2. Focus Element	3. Next Lower Level or Characteristic Type	FUNCTION ANALYSIS (STEP 3): 1. Next Higher Level Function and Requirement	2. Focus Element Function and Requirement	3. Next Lower Level Function and Requirement or Characteristic
1		Fluid Pump	Internal Motor	Electric Motor	Pumps fluid through the system from the tank	The motor that is inside the pump that pushes the fluid	The electric motor that spins the fins that moves the fluid
2		Fluid Resivoir	Main Tank	Acrylic sides	Holds the fluid for the system	Is the main area that the fluid is stored	The sides of the tanks that are made of acrylic
3		Fluid Lines	Fittings	Line to fitting connection	Medium for the fluid to move through the system	Connects the lines to components in the system	Connect the fittings to the line (most likely through compression)
4		Secondary Pump Overflow	Waterfall/Spout	Mechanical Support	Allows fluid from the secondary tank to go into the main tank	The part that the fluid uses as a medium to go into the tank	Mechanical supports that hold up the (waterfall/spout)
5		OLED Screen failure	Indication	Aesthetics	Provides focus element and display	The OLED screen and connection board	Adds an interest element to the unit
6		Electrical enclosure overheat	Power distribution	Sensor connections	Powers all functions of the unit	Power supplied to the pump and sensors	Provides connection points for the sensors

Testing

- Fittings - Initial fittings were prone to leak – New fittings have better seals
  Challenging to disconnect the lines – New quick-disconnect are easy to take apart

- Water - Avoid using purified water. Flow sensor will not function properly. Use only tap or spring water.

- Pump - Initial pump had weak flow – New pump has a higher flow

- Ramp - Initial design needed modification to aux tank – New design sat on top of aux tank
  Initial design was two pieces – New design one single piece